

Evaluation of Recovery Patterns in Post- Operative Patients Using Fast-Track Criteria and Modified Aldrete Scoring System after Surgical Anaesthesia in Patient Management

1. Muhammad Salman Maqbool 2. Arshad Saleem Shahani 3. Muhammad Umer Draz

1. Asstt. Prof. of Anesthesiology & Intensive Care, Islam Medical College, Sialkot

2. Consultant, Dept. of Anesthesia and Intensive Care, Holy Family Hospital, Rawalpindi 3. Medical Officer, Medical Unit-II, Benazir Bhutto Hospital, Rawalpindi.

ABSTRACT

Aim: The post-operative period is the most critical phase for the surgical patients, requiring close observation. A study was conducted to assess and evaluate patients post-operative recovery course following surgical anesthesia using post anesthesia recovery assessment scoring systems for optimal and timely patient management, so as to ensure a safe postoperative recovery course, thus decreasing morbidity as well as mortality.

Study Design: Observational Study

Place and Duration of Study: This study was carried out in the Department of Anesthesia and Intensive Care, Holy Family Hospital, Rawalpindi, from the period 30-01-2010 to 18-2-2010 and in the Department of Anesthesia and Intensive Care Unit, Islam Teaching Hospital, Islam Medical college, Sialkot, from 16-9-2010 to 28-2-2011.

Materials and Methods: In the study, patients undergoing elective surgical procedures in general as well as regional anesthesia were included. The patient's age group was between 15-85 years and belonged to American Society of Anaesthesiologists (ASA) physical status class 1-3 as well as medically optimized ASA-class 4 patients. On discontinuation of general anesthesia patients were assessed for conscious state, cardiovascular stability (pulse and blood pressure) and motor recovery. The Fast-Track criteria were used to assess initial recovery of patient in the operating area. Patients were then shifted to Post Anesthesia Care unit, where recovery assessment was done by continuation of Fast-Track Criteria^{1,2,3} and also by employing the Modified Aldrete scoring system⁴ immediately, and at five, fifteen, thirty minutes and then at one hr interval depending on clinical physiological status of the patient and the level of score achieved. The patients further management intervention was guided in the light of scores attained, which depicted the physiological alteration. The Post-Anesthesia Discharge scoring system^{5,6} and Aldrete recovery score⁷ modified for day surgery was used to assess physiological status of patient before shifting them to the surgical ward or for assessment of home readiness.

Data was compared and analyzed by SPSS version 17. Mean $\pm$ S.D was calculated for quantitative variables, age etc. Frequencies and percentages were presented for qualitative variables e.g. gender and various scoring systems used in the study. Spearman's Rank correlation was used to check interdependence between the two variables i.e. Fast-Track criteria^{1,2,3} and Modified Aldrete scoring system⁴. The P-value of <0.05 was considered statistically significant.

Results: A total of one hundred and ninety nine patients were checked in the study (one hundred and six females and ninety three males) out of which one hundred and fifty seven i.e. 78.89% patients were shifted to respective wards uneventfully. A total of eleven patients i.e. 5.52% needed urgent advanced management care and were shifted to surgical intensive care, while three patients i.e. 1.50% were placed on ventilatory support as guided by the recovery scoring system scores attained and pathological status of the patients. Thirty one patients i.e. 15.57% were discharged to home safely. Thirty patients i.e. 15.07% were 'Fast Tracked' in the study from the operation theatre bypassing the first stage of the traditional two stage recovery process. The value of correlation co-efficient (r) was significant at the 0.01 level.

Conclusion: The Fast-Track scoring criteria^{1,2,3} along with Modified Aldrete scoring system⁴ offers guidance in evaluating post-operative recovery of patients from surgical anesthesia for optimal patient management, so as to decrease morbidity.

Key Words: Post Anesthesia Care Unit, Recovery Scores, Anesthesia.

INTRODUCTION

The early post-operative period is potentially the most dangerous for the surgical patients requiring watchful and attentive supervision by skilled medical/nursing

staff, if serious complications are to be avoided. In the past, the record of the patient progress during this period usually consisted of "vital signs" and accompanying nurse's notes. These often failed to communicate a clear picture of the status of the patient.

In recent years the emphasis in providing anesthetic services has undergone a transitional change. With the busy elective surgery schedule, the need arises of safe recovery of patients from anesthesia. Several methods have been described for assessing objectively the progress of recovery from general as well as regional anesthesia. These include Fast-Track criteria^{1,2,3}, Modified Aldrete scoring system⁴, Post Anesthesia Discharge score^{5,6} Aldrete score⁷, The Simplified Post-Anesthetic Recovery Score⁸ and others. Some of these tests are used for the assessment of early recovery, while others are used in assessing recovery of patient before shifting to surgical ward from Post Anesthesia Care unit or home readiness as in the case of ambulatory surgery.

Assessment and documentation of a scoring system is recommended to facilitate the overall assessment of patient readiness for discharge from Phase I to Phase II and from phase II to Phase III extended observation or home, but does not replace critical thinking and specific physician directives. It is also vital that results be interpreted with medical judgment. The results of scoring systems should be incorporated into recovery room record. The recovery scores provide a uniform and definitive account of the progress of the patient through important stages in his recovery from surgical anesthesia and return of protective functions. It also establishes a routine of repeated re-evaluation which should result in improved patient supervision. The described system used in our study is simple enough that it will neither distract the nurse from patient care nor impose an extra burden. The retrospective analysis of the exact status of a patient at a given time after operation can be utilized and may be valuable as a research tool in comparing recovery following various techniques of general anesthesia.

The aim of this study was to ensure safe, timely and appropriate discharge of patient from Post-Anesthesia Care unit to the respective areas whether home, ward or I.C.U by using scoring systems i.e. Fast-Track criteria^{1,2,3}, Modified Aldrete scoring system⁴, Post Anesthesia Discharge score^{5,6} and Aldrete score⁷.

We hypothesized that using two stated recovery scoring criteria's i.e. Fast-Track criteria^{1,2,3} and Modified Aldrete scoring system⁴ will help in appropriate assessment of recovery from anesthesia and provide guidance so as to immediately take appropriate necessary actions for better and optimal patient management. The Post Anesthesia Discharge score^{5,6} and the Aldrete score⁷ was used in the study to evaluate the patients physiological status before shifting them from the Post Anesthesia Care unit to the surgical ward or for assessment of home readiness.

MATERIAL AND METHODS

After approval from hospital ethical committee and obtaining informed consent, this observational study

was carried out in the Department of Anesthesia and Intensive Care, Holy Family Hospital, Rawalpindi, from 30-01-10 to 18-2-10 and in the Department of Anesthesia and Intensive Care Unit, Islam Teaching Hospital, Islam Medical college, Sialkot, from 16-9-10 to 28-2-2011. In the study, patients undergoing elective surgical procedures in general as well as regional anesthesia were included. The patient's age group was between 15-85 years and belonged to American Society of Anaesthesiologists (ASA) physical status class-1-3 as well as medically optimized ASA class- 4 patients. The patients were seen a day before planned surgery for standard pre-operative anesthesia assessment.

All patients received standardized anesthetic technique using Propofol 2mg/kg intravenously. Tracheal intubation was facilitated by use of muscle relaxant with either Inj.Succinyl Choline 1mg/kg or Atracurium 0.5mg/kg intravenously. After tracheal intubation anesthesia was maintained with volatile agent Isoflurane in titrated dose in combination with Nitrous Oxide in 60% Oxygen. Following completion of surgery anesthesia was discontinued and the patients were assessed for conscious state, cardiovascular stability (pulse and blood pressure) and motor recovery. Inj.Noestimine 2.5mg along with Inj.Glycopyrrolate 0.6mg was given intravenously to reverse any residual effects of muscle relaxant. Patients were extubated on fulfilling standard criteria. The Fast-Track criteria^{1,2,3} was used to assess recovery of patient from general anesthesia in the operating room. Patients were then shifted to Post Anesthesia Care unit where immediate oxygen saturation on air was noted before supplemental oxygen was given. The patients further recovery assessment was done by continuation of Fast-Track Criteria^{1,2,3} and also by employing the Modified Aldrete scoring system⁴ immediately, and at five, fifteen, thirty minutes and then at one hr interval depending on clinical physiological status of the patient and the level of score achieved.

In our study, it was made sure that every patient was seen following their operation by the anesthetist and surgeon involved in their respective case in post anesthesia care unit. The patients further management intervention was guided in the light of scores attained, which depicted the physiological alteration. Meticulous attention was paid to patient's ventilatory pattern, cardiovascular stability, oxygen saturation, and conscious state i.e. physiological stability. The Post Anesthesia Discharge score^{5,6} and Aldrete score⁷ was used to assess status of patient before shifting to respective wards or for assessment of home readiness.

RESULTS

A total of one hundred and ninety nine patients were checked in the study (one hundred and six females and ninety three males) out of which one hundred and fifty seven i.e. 78.89% were shifted to the respective wards

uneventfully. Thirty one patients i.e. 15.57% were discharged to home safely. The mean age of patients was 34.66 years, range between fourteen and eighty five years with a standard deviation of 16.431.

In the study thirty one patients i.e. 15.57% were discharged to home. Thirty patients i.e. 15.07% were 'Fast Tracked' in the study from the operation theatre bypassing the first stage of the traditional two stage recovery process.

The measures of central tendency for all the scoring systems used in the study are recapitulated in Table-1. Spearman's Rank correlation was used to check interdependence between the two variables i.e. Fast-Track criteria^{1,2,3} and Modified Aldrete scoring system⁴. The value of correlation co-efficient (r) was 0.450. The correlation was significant at 0.01 level depicted in Table-2.

Table No.1: Measures of central tendency of all recovery scoring systems in study.

Statistics					
		Modified Aldrete score	Fast Track criteria	Aldrete scoring	Post Anesthesia Discharge Score
N	Valid	198	198	198	197
	Missing	136	136	136	137
Mean		9.55	12.95	15.83	8.44
Std. Error of Mean		.062	.108	.188	.068
Median		10.00	13.00	14.00	8.00
Mode		10	14	14	8
Std. Deviation		.870	1.526	2.650	.960
Variance		.756	2.328	7.023	.921
Range		7	12	10	5
Minimum		3	2	10	5
Maximum		10	14	20	10

Table No. 2: Spearman's Rank Correlation.

			Modified Aldrete Score	Fast Track Criteria
Spearman's rho	mod. aldrete score	Correlation Coefficient	1.000	.450**
		Sig.(2-tailed)	.	.000
		N	198	198

**Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

Recovery from anesthesia is a continual process, the early stages of which overlap with the end of operative anesthesia. The attainment of patient's full pre-operative physiological status from general anesthesia extends from minutes to days. It is conveniently divided into various phases⁹. The Phase-I, starts from

discontinuation of anesthesia and continues into the high dependency atmosphere of the Post Anesthesia Care unit. Phase-II is when the patients are shifted to the respective wards and final full psychological as well as physiological recovery at home i.e. Phase-III. Reiterating, these phases not only entirely depict locations, but also the level of care involved.

The various phases of patients recovery need to be addressed as pre-mature discharge may lead not only to patient's morbidity but also has medico legal concerns as well. The scoring system also helps in identifying patients needing immediate intervention to restore physiological homeostasis. The Aldrete score is a well established scoring system that has been used to determine when the patient can be safely discharged from post anesthesia care unit to phase-II i.e. the surgical ward⁹. However; with the introduction of pulse oximetry a modification of Aldrete scoring⁴ was introduced, which was used in our study. In this version, the need for room air oxygen saturation is >92%. Chung F¹⁰ in his study by using Post Anesthesia Discharge score^{5,6} was able to discharge most patients safely i.e. 82% and 95.6% of cases within two and three hrs respectively after surgery. Only in 4.4% of the cases discharge was delayed due to factors like recurrence of pain, unavailability of immediate escorts etc. Removing the requirement of drinking and voiding and separating the pain, nausea and vomiting scores produced the version of Post Anesthesia Discharge score^{5,6} used in our study.

Patients undergoing regional anesthesia should undergo assessment of recovery under the same standards of postoperative care¹¹. Some authors have shown faster discharges after regional anesthetic techniques¹¹. However regional anesthesia does bring unique advantages and problems to the ambulatory settings¹². Spinal anesthesia is a simple and reliable technique that has been used widely for regional anesthesia¹³. Suitable criteria to judge recovery after regional anesthesia include perianal sensations, plantar flexion of big toe and proprioception¹⁴ and these tools were used in our study. After epidural or spinal anesthesia patients were permitted to sit up only after return of full sensation to the affected areas and were permitted to ambulate only after complete resolution of motor, sensory and sympathetic blockade in our study.

The use of balanced anesthetic techniques and introduction of newer anesthetic agents, with titration of their doses and guided by clinical observation, hemodynamic data and indirect effects of anesthetic agents on the cardiovascular system during surgical anesthesia, allow rapid awakening from anesthesia and early recovery may be completed in the operating room. Some patients are now being transferred directly from the operating room table to step down unit bypassing the Post Anesthesia care unit. This process is known as "Fast Tracking"¹⁵. It was also implemented in our study

by employing Fast-Track criteria in the operating area, along with ability of the patient to be in fully conscious state and stable hemodynamically state as to move themselves over with minimal assistance from the operating table to the shifting trolley after fifteen to twenty minutes of the end of the surgery.

The discharge process in the study for home was so designed that the patient and the attendants understood their role and responsibilities in the ongoing care and felt confident to go home. The patients were also given written instructions in detail. The patient and the attendants were aware of the signs and symptoms to watch for that would necessitate their return to hospital. The communication was given much importance. The criteria for discharge from the recovery room recommended by the Association of Anesthetists of Great Britain and Ireland were used as guidelines in our study¹⁶.

The anesthesiologist was consulted finally prior to shifting of patient from Post Anesthesia Care unit to the destined areas. The discharge in our study was not time based but varied according to patient's physiological status.

Readmission rate was nil in the population studied. The noteworthy post-operative symptoms noted in our study, were surgical pain in fifty-four patients i.e. in 16.2% patients post operative analgesics was administered. In one hundred and forty-four patients i.e. in 43.1% patients no postoperative analgesia was required during stay in Post Anesthesia care unit. Three patients complained of nausea and vomiting, hypoglycemia noted in one patient, bronchospasm requiring nebulization was required in two patients in Post Anesthesia care unit. A total of eleven patients i.e. 5.52% needed urgent advanced management care and were shifted to surgical intensive care. Out of which five bypassed Post Anesthesia Care unit for advanced surgical intensive care, while three patients i.e. 1.50% were placed on ventilatory support electively due to clinical pre-morbid states, the recovery scoring system scores attained and the type of surgery e.g. craniotomy, abdominal aortic aneurysm and whipple procedure. The value of correlation co-efficient (r) between the Post Anesthesia Discharge score^{5,6} and Aldrete score⁷ in our study was 0.389 and the correlation was significant at the 0.01 level.

The Aldrete scoring system¹⁷ first described in 1970 assigned a score of 0,1 or 2 to activity, respiration, circulation, consciousness and color. The recovery score modified for day case Surgery was published by Aldrete⁷ in 1995. This scoring system was utilized in our study.

Dexter et al¹⁸ in their study, while using computer simulations analyzed that by implementing new recovery assessment criteria's the efficient utilization of services can be achieved. Thus overall cost can be reduced as well without compromising patient's safety.

In the study done by Kajyama S and colleagues¹⁹ on post operative recovery of patients using Post Anesthesia Discharge score^{5,6} they found it to be useful for safe discharge of patients from Post Anesthesia care unit. Chung F⁶ in his study stated that Post Anesthesia Discharge score is a simple, practical scoring system and also provided uniform assessment of patient for safe discharge. They also used Aldrete score for initial evaluation of post-operative recovery from anesthesia in their study. They found Post Anesthesia Discharge score to be having superior measurement scaling and diagnostic properties. In our study the drinking of water i.e. ability to retain orally administered fluids and voiding for those patients who were not at risk of urinary retention was not considered hindrance in safe discharge of patient's to the surgical ward. In study done by Schreiner MS²⁰ et al drinking might not be a necessary factor for discharging patient's after surgery. Fritz WJ²¹ in their study, noted that patient's not at high risk of urinary retention can be safely discharged before they have voided without urinary retention at home. The risk factors for postoperative urinary retention included a history of postoperative urinary retention, spinal/epidural anesthesia, pelvic or urological surgery, and perioperative catheterization. This regimen was implemented in our study with modification that in our set up voiding within the hospital was applied.

To evaluate psychological performance postoperatively various tests were used in the past. The common ones were Modified Gestalt test - the Trieger dot test²², driving simulators²³ and reaction time test²⁴. Many are complex and time consuming. The major drawbacks of these tests being they only assess recovery of one part of the brain function, rather than complete recovery of patient and they were not utilized in our study.

As patient's length of stay in Post Anesthesia Care unit depends on a number of factors, including pre-operative health status, surgical procedure, and type of anesthesia administered and the stability of vital signs. A study by Riley and colleagues²⁵ pointed out the methodological problems in developing a valid measurement tool for post-anesthetic recovery assessment discharge scoring. Therefore for this purpose Standards for Post Anesthesia Care were documented to encourage quality of patient care, but they cannot guarantee any specific patient outcome²⁶.

The scoring system also provides uniform assessments of all patients. These post-anesthesia recovery scores are similar in principle to the Apgar score²⁷ used to evaluate condition of the newborn.

CONCLUSION

Simple recovery scoring systems are necessary in order to standardize end points of clinical recovery to encompass widely varied co-morbid states of surgical patients during the conduct of clinical research. The

Fast-Track scoring criteria along with Modified Aldrete scoring system can offer reliable guidance in evaluating physical status of patient post-operatively recovering from surgical anesthesia for optimal patient management. Further studies to identify special characteristics of surgical patients with altered/delayed recovery from anesthesia are warranted.

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Address for Corresponding Author:

Dr. Muhammad Salman Maqbool

Assistant Professor, Islam Medical College, Sialkot.

Address: H.No.573, St.No.69, Sector I-8/3, Islamabad

E-mail: salman5732000@yahoo.com

Cell: 0345-5117736